The invention relates to inducing tolerance to transplanted materials such as allogeneic, xenogeneic, and autogeneic materials transplanted into a patient and to restoring self-tolerance in the case of autoimmunity conditions. Certain embodiments of the invention relate to creating mixed chimerism in patients and treating graft rejection, malignant cell growth, and autoimmune conditions. Tissue donors may be living or cadaveric, for example, a living or cadaveric pancreatic islet or kidney donor. The invention also includes a method of transplanting pancreatic islet cells from a donor to a recipient by administering a bone marrow cell transplant and a pancreatic islet cell transplant from a donor to a recipient, administering a conditioning treatment to the recipient that is mildly myeloablative, and administering an immune blockade treatment to the recipient.

